

Remarks

This paper is filed in response to the Office Action dated December 30, 2004. Prior to entry of this paper, claims 1-33 were pending, of which claims 28-33 are withdrawn. The Office Action rejects claims 1-17 and 21-24 under 35 U.S.C. §102(b), as being anticipated by U.S. Patent 6,159,073 to Wiswesser et al. (Wiswesser). The Office Action also indicates that claims 18-20 and 25-27 would be allowable if rewritten in independent form including all limitations of the base and intervening claims.

With this Submission, claims 1, 20, and 21 are amended, of which claims 20 and 21 are amended to correct typographical errors, and new claim 34 is added. No new matter is introduced with these amendments. Support for the amendment to claim 1 may be found at least in the specification at page 10, lines 21-24, page 15, lines 17-27, and in Figures 5 and 6. Support for new claim 34 may be found at least in the originally filed claims, and at page 4, lines 11-24.

Applicants submit that claim 34 is patentable over the cited art because, as discussed below, Wiswesser does not teach or suggest "... providing a model for wafer polishing that defines a plurality of substantially annular regions on a wafer, identifies a wafer material removal rate in a polishing step for each of the regions, and defines the effect of the tool state on polishing effectiveness..." as recited in the claim.

Reconsideration of the claims 1-33 in light of the remarks that follow is respectfully requested.

I. Interview Summaries (37 CFR Sec. 133).

Applicants thank the Examiner for the courtesy of the telephonic interview on April 27, 2005, during which claims 1 and 2 were discussed, and distinguished from U.S. Patent 6,159,073

to Wiswesser et al., as discussed below. Applicants further thank the Examiner for the second telephonic interview of June 9, 2005, during which the request for withdrawal of finality of the Office Action for the reasons set forth below were discussed.

II. Request for Withdrawal of Finality of Office Action

Applicants hereby request that the Finality of the Office Action be withdrawn.

Applicants submit that the finality of the Office Action is improper because it rejects unamended claims over newly cited art. A second or any subsequent action on the merits in any application should not be made final if it includes a rejection, on newly cited art, of any claim not amended by applicant in spite of the fact that other claims may have been amended to require newly cited art. MPEP 706.07(a) (emphasis added).

In the current application, claims 21-24 were not amended in the Reply mailed September 14, 2004, and are rejected over newly cited prior art (U.S. Patent 6,159,073 to Wiswesser et al.). Thus, the rejection should not be made final. Withdrawal of the finality of the rejection is respectfully requested.

III. Rejection of the claims over Wiswesser et al. under 35 U.S.C. 102(b)

Claims 1, 2, 3-5, 14-17, and 21-24 are rejected under 35 U.S.C. 102(b) over U.S. Patent 6,159,073 to Wiswesser et al. (Wiswesser).

As indicated in the Office Communication at page 2, Wiswesser teaches a method of measuring substrate layer thickness during chemical mechanical polishing. Wiswesser states, for example,

“The thickness of a substrate layer on a blank wafer may be measured
in-situ ... to characterize the effectiveness of the CMP tool and process.”

[Emphasis added.] (Col. 3, line 64 to col. 4, line 1.)

Thus, Wiswesser teaches in-situ measurement of the wafer during a polishing step, and does not teach or suggest measurement of the “post-polished wafer” as recited in claim 2. Wiswesser records information obtained from in situ measurements of the wafer and uses the information to determine a model of the wafer being polished. Wiswesser explains that

“the model function is used to calculate the initial thickness, polishing rate, remaining thickness and amount removed...a measure of substrate flatness can be made.” (Col. 8, l. 53-57).

The Wiswesser method provides information in real time about the wafer being polished and is not concerned with updating a model “based upon the wafer ... model of step (a),” as recited in claim 2.

The cited art certainly does not mention or suggest updating a wafer-polishing model based on measurements of one or more post-polished wafers. The provision of the ability to update a polishing model is significant because, e.g., it enables a polishing process to use a model that has been corrected for the effect of drift in the polishing process conditions and to include in the model empirically discovered effects omitted from the original model. *See* page 10, lines 21-28 of the application. In summary, Wiswesser does not teach or suggest “...polishing a wafer using a first polishing recipe ... determining a wafer thickness profile for the post-polished wafer ... and calculating an updated polishing model ...,” as recited in claim 2. Since Wiswesser does not require or contemplate the features described above, applicants respectfully submit that claim 2 and those dependent thereon are patentable over Wiswesser.

With regard to claim 21, Wiswesser does not teach or suggest a method of “providing a model defining the effect of tool state on polishing effectiveness” or “polishing the ... wafers in a plurality of polishing steps.” The provision of a model that incorporates the effect of tool state

on polishing effectiveness is significant because the tool state affects the polishing process.

Wiswesser does not teach or suggest such a feature in its in-situ measuring technique. Therefore, applicants respectfully submit that claim 21 and those dependent thereon are patentable over Wiswesser.

Applicants further submit that Wiswesser does not anticipate claim 1 because Wiswesser does not teach or even suggest “providing a model for wafer polishing..., wherein the model is based on measurements of one or more wafers that have completed the polishing step and ... polishing a wafer using a polishing recipe based on the model ...” as recited in amended claim 1. Wiswesser is concerned with in-situ measurement of a wafer during polishing, and not with a model for wafer polishing based on measurements of a wafer that has completed a polishing step.

Since Wiswesser does not require or contemplate the features described above, applicants respectfully submit that claim 1 and those dependent thereon are patentable over Wiswesser.

IV. Rejection of the claims over Wiswesser et al. under 35 U.S.C. 103(a)

Claims 6-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wiswesser. Applicants respectfully submit that since fewer than all the elements of claims 1 and 2 from which claims 6-13 depend are taught or suggested by Wiswesser, as discussed above, that claims 6-13 are not obvious over Wiswesser.

V. Allowable Subject Matter

Claims 18-20 and 25-27 are objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants respectfully submit that since base claims 1, 2, and 21 from which the objected to claims 18-20 and 25-27 depend are allowable, as discussed above, that the objections should be withdrawn.

Conclusion

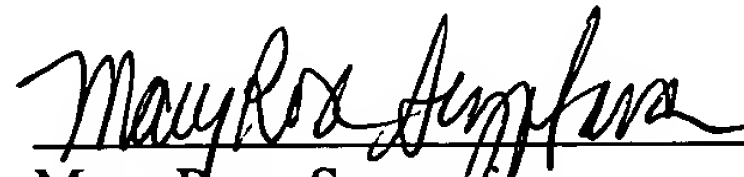
For the forgoing reasons, Applicants submit that the rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) and the objections be withdrawn, and that claims 1-27, and 34 are in condition for allowance.

Authorization

The Commissioner is hereby authorized to charge any additional fees that may be required for this Amendment, or credit any overpayment to deposit account no. 08-0219. Applicants submit a petition for a two-month extension of time. In the event that an additional extension of time is required to make this response timely, the Commissioner is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to deposit account no. 08-0219.

Respectfully submitted,

June 9, 2005



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Date: June 9, 2005